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# Clinical phenomenon of haemobartonellosis in cats in the urban environments.

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**ABSTRACT**

Hemobartonellosis carnivorous is a widespread disease. Some researchers identify 2 types of pathogens in dogs (Mycoplasma haemocanis, Candidatus Mycoplasma haematoparvum) and 3 species in cats (Mycoplasma haemofelis, Candidatus Mycoplasma haemominutum, Candidatus Mycoplasma turicensis). Mycotrophic hemoplasm (hemobartonella) affects erythrocytes, because of which there is a decrease in the content of red blood cells and hemoglobin in the blood. These processes lead to disruption of oxygen supply of cells and tissues, acid-base balance is disrupted, acidosis develops. When diagnosing this disease, the main difficulties are related to the cyclic occurrence of the pathogen in the blood, localization on the erythrocyte surface, its small size and the breadth of the spectrum of clinical manifestations. In most cases, gemobartonellosis manifests itself against the background of viral infections, injuries, stress, and other factors that reduce the resistance of the body. According to the literature available to us, the clinical manifestation, hematologic changes and methods for diagnosis of hemobartonellosis are not well understood. SA Bolyakhina (2001), Davydova OE and Shemyakova DN (2011), etc. in their studies on the study of hemobartonellosis in cats, noted the presence of acute, subacute and chronic course. At the same time, from the hematological parameters of the general blood test of patients with hemobartonellosis of cats, only: the number of erythrocytes, hemoglobin, and hematocrit. This article presents the results of a study of clinical and hematological indicators in cats in acute, subacute and chronic gemobartonellosis in Stavropol.

**Keywords:** hemobartonellosis, cats, hematocrit, platelets, granulocytes, anemia.

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## INTRODUCTION

According to the available literature, the clinical manifestation of hemobartonellosis in cats is widespread in our country and the world, however, clinical manifestation, hematological changes and diagnostic methods of this disease are poorly understood. Cats have identified 3 species of the causative agent of the disease (Mycoplasma haemofelis, Candidatus Mycoplasma haemominutum, Candidatus Mycoplasma turicensis) Balakhina S. A. (Novosibirsk, 2001), Davydova O. E. and Chumakovym D. N. (2011) in their studies of hemobartonella cats had acute, subacute and chronic. [1, 2, 3, 4, 5, 6,7, 8]. At the same time of hematological parameters in blood of patients with hemobartonellosis cats just described: the number of erythrocytes, hemoglobin, and hematocrit [2, 7, 8].

## MATERIALS AND METHODS

Studying the nature of the manifestation of hemobartonella cats in 2011-2017 in veterinary clinics of the city of Stavropol, we evaluated the General condition of sick animals: measured body temperature examined smears of peripheral blood, stained by Romanovsky – Gimsa, the presence of hemobartonella, carried out the hematological tests.

All experimental animals blood was taken for hematological studies from the subcutaneous vein of the forearm. For the taking of blood using disposable vacutainer tubes with EDTA anticoagulant (K 3 EDTA). General analysis of blood was carried out using an automated analyzer Mythik 18 (France) and PCE – 90 – Vet (Japan), using reagents of Cormay (Poland).

The analysis of numerical values was carried out using one-way analysis of variance and multiple comparisons using the Newman-Keyles criterion in the Primer of Biostatistics for Windows-XP program. Differences were considered valid for $p < 0.05$.

## RESULTS AND DISCUSSION

According to the received data from the outpatient clinics of veterinary clinics of the city, 737 cats were registered for haemobartonellosis, and it proceeded in different ways (Table 1).

Analyzing the data of Table 1, we found that gemobartonellosis is found in associative form with other diseases and in monoinvasions. In patients with hemobartonellosis of animals with mixed invasion, viral leukemia of cats (FeLV), feline immunodeficiency virus (FIV), calicivirosis, panleukopenia, etc. are often found. In the associative course, the invasion was 46.4% (342 heads). In monoinvasia, the disease is less common - 20% (147 head). The acute course of the disease is less common and usually after an illness or during an associated course with other diseases 14.2% (107 heads), more often are registered: subacute - 22.1% (161 heads), chronic - 30% (221 heads), asymptomatic (latent) - 33.64% (248 head) and associated 46.4% (342 heads).

When conducting our own research, we observed 128 patients with haemobartonellosis of animals, including in association with calicivirus - 12 cats and 116 cats in a single-infusion.

In patients with animals with monoinvasion, four groups with different course of the disease were identified: acute course - 30 heads, subacute - 38 heads, chronic - 49 heads and asymptomatic - 11 cats.

All animals were examined clinically. They were taking blood for a hematological study. In patients with hemobartonellosis of animals, various clinical signs and hematological indices were observed in each of the manifestations of the disease. We were faced with the associative course of gemobartonellosis and calicivirosis. In patients with animals noted: lethargy, general anemia, increased body temperature to 40.3˚C, an increase in lymph nodes, discharge from the nose and eyes, small ulcers in the oral cavity and in the tongue, in some cases: hematuria, ultrasound observed an increase in the spleen. In sick animals in a serious condition, in addition to the above, observed: a decrease in temperature to 35.1 ˚ C, severe dehydration, pronounced general anemia, vomiting, cachexia (not in all cases). In the smears of peripheral blood, hematobartonella was detected.

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**Table 1: Types of gemobartonellosisin cats**

| Type | 2011 | | 2012 | | 2013 | | 2014 | | 2015 | | 2016 | | 2017 | | Total | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | quantity | % | quantity | % | quantity | % | Quantity | % | quantity | % | quantity | % | quantity | % | quantity | % |
| Associative | 56 | 7,6 | 63 | 8,5 | 65 | 8,8 | 68 | 9,22 | 41 | 5,56 | 29 | 4 | 20 | 2,7 | 342 | 46,4 |
| Acute | 15 | 2 | 22 | 3 | 24 | 3,2 | 12 | 1,62 | 18 | 2,44 | 11 | 1,5 | 5 | 0,6 | 107 | 14,2 |
| Podystroie | 19 | 2,5 | 29 | 4 | 21 | 2,8 | 23 | 3,12 | 32 | 4,3 | 21 | 2,8 | 16 | 2,1 | 161 | 22,1 |
| Chronic | 32 | 4,3 | 34 | 4,6 | 31 | 4,2 | 41 | 5,56 | 45 | 6,1 | 26 | 3,5 | 12 | 1,6 | 221 | 30 |
| Asymptomatic | 35 | 4,7 | 40 | 5,4 | 82 | 11,1 | 35 | 4,74 | 28 | 3,8 | 20 | 2,7 | 8 | 1,1 | 248 | 33,64 |

**Table 2: Hematologic indices of red blood of patients with haemobartonellosis of cats (M ± m)**

| Group | Disease course | Leukocytes, 109 cells / l | including | | |
|---|---|---|---|---|---|
| | | | Granulocytes, 109 cells / l | Lymphocytes, 109 cells / l | Monocytes, 109 cells / l |
| 1 | Acute | 31.72±10.15*↑ | 3.8±0.6819 | 22.58±5.33*↑ | 0.662±0.4083*↑ |
| 2 | Podystroie | 21.16±3.012*↑ | 7.26±0.2302*↑ | 13.42±2.69*↑ | 0.626±0.1606*↑ |
| 3 | Chronic | 15.58±7.197*↑ | 6.82±3.663*↑ | 8.1±6.091*↑ | 0.42±0.2387 |
| 4 | Bearing | 7.102±1.616 | 3.204±1.228 | 2.168±1.13 | 0.84±0.3578*↑ |
| Norm | | 11.58±5.237 | 5.14±2.213 | 2.82±1.847 | 0.404±0.3522 |

Note: $p<0.05$, * - significant deviation from the norm.

**Table 3: Hematologic indices of white blood in cats with haemobartonellosis (M ± m)**

| Group | Disease course | Erythrocytes, 1012 cells / l | Hemoglobin, g / l | Hematocrit, l / l | Platelets, 109 cells / l |
|---|---|---|---|---|---|
| 1 | Acute | 1.178±0.145*↓ | 31±4.899*↓ | 0.285±0.03886*↓ | 25±8.216*↓ |
| 2 | Podystroie | 2.676±0.6388*↓ | 46±4.301*↓ | 0.165±0.02655*↓ | 71.4±12.4*↓ |
| 3 | Chronic | 5.018±0.5087*↓ | 89.2±17.08*↓ | 0.261±0.05621*↓ | 144.8±55.8*↓ |
| 4 | Bearing | 6.482±0.1579 | 105.6±12.05 | 0.252±0.008649*↓ | 330±32.18 |
| Norm | | 7.06 ±2.356 | 113.4±26.75 | 0.383±0.08482 | 456±132.8 |

Note: $p<0.05$, * - significant deviation from the norm.

In the acute course of the disease in animals noted: lethargy, shortness of breath, general anemia, fever to 39.5 - 40.2 ° C, and in some cases, a weak icicle of the visible mucous membranes and hemoglobinuria. Also, cases were recorded when in animals with the acute course of the disease in a serious condition, the body temperature increased for the first two days to 39.5 - 40 ° C, then sharply decreased to 36-35.2 ° C, in this case, the animal, as a rule, died. The disease lasted depending on the severity of the patient's condition for 8 to 15 days.

In smears of peripheral blood from the day of fever, hemobarathony was detected, parasitemia was 20%. Cats with subacute clinical course observed clinical signs similar to those in animals with the acute course. However, the distinctive feature was the presence of pronounced ictericity of the visible mucous membranes and even the skin, and in some cases hemoglobinuria. Parasitemia was 35%. The disease lasted 14-25 days.

In cats with the chronic course, general oppression, anemia with mild jaundice of visible mucous membranes, a temperature within the norm of 38-39 ° C were noted. Parasitic is 15%. The disease lasted 24-30 days.

In patients with asymptomatic animals, no clinical signs were observed, with the exception of a slight anemia of the visible mucous membranes. In the smears of peripheral blood, single hemobarathony was detected.

Analyzing the results of the conducted blood tests, we noted that in cats with a different course of hemobartonellosis, the hematologic indices differed significantly from each other (Tables 2, 3).

In the acute course, a sharp decrease in the number of erythrocytes was observed, 1,178 ± 0.145 * 1012 cells / l, hemoglobin 31 ± 4.899 g / l, platelets 25 ± 8.216 * 109 cells / l, a slight decrease in hematocrit to 0.285 ± 0.3886 l / also a significant increase in the number of leukocytes 31,72 ± 10,15 * 109 cells / l, including lymphocytes 22,58 ± 5,33 * 109 cells / l, monocytes 0,662 ± 0,4083 * 109 cells / l. That is, the number of red blood cells decreased 6 times, hemoglobin 4 times, platelets 18.5 times, hematocrit 1.5 times, and the number of leukocytes increased 3 times: granulocytes within the norm (3.8 ± 0.6819 * 109 cells / l), lymphocytes 22.58 ± 5.33 * 109 cells / l - 8 times higher than normal, monocytes 0.662 ± 0.4083 * 109 cells / l - 1.5 times higher than normal.

In the subacute course, a decrease in the number of erythrocytes was observed 3 times (2,676 ± 0,6388 * 1012 cells / l), hemoglobin 3 times (46 ± 4,301 g / l), thrombocytes 6.5 times (71.4 ± 12.4 * 109 cells / l), a 2.5-fold decrease in hematocrit (0.165 ± 0.02655 l / l), and a significant increase in the number of leukocytes by a factor of 2 (21.16 ± 3.012 * 109 cells / l), including number of lymphocytes 5 times (13.42 ± 2.69 * 109 cells / l), monocytes 1.4 times (0.626 ± 0.1606 * 109 cells / l) and granulocytes 1.5 times (7.26 ± 0.2302 * 109 cells / l).

In chronic course, a decrease in the number of erythrocytes (5.018 ± 0.5087 * 1012 cells / l), hemoglobin (89.2 ± 17.08 g / l) and hematocrit (0.261 ± 0.055621 l / l) in 1.5 times below normal, but the number of platelets was significantly lower than normal (144.8 ± 55.8 * 109 cells / l) by 3.5 times. There was also a slight increase in the number of leukocytes (15.58 ± 7,197 * 109 cells / l) by a factor of 1.5: the amount of granulocytes (6.82 ± 3.663 * 109 cells / l) - 1.5 times increased, monocytes (0.42 ± 0.2387 * 109 cells / l) within the normal range and a significant increase in lymphocytes (8.1 ± 6.091 * 109 cells / l) in 3 times.

In the asymptomatic course of the disease, all hematologic indices in cats were within normal limits, except for the number of monocytes, which was increased to 0.84 ± 0.3578 * 109 cells / l, i.e. 2 times higher than normal.

The acute and subacute course of hemobartonellosis is accompanied by: lethargy, dyspnea, pronounced general anemia, with acute disease - ictericity of the visible mucous membranes, rise in temperature to 39.5 - 40.2 ° C, hemoglobinuria. The following changes in hematological parameters were also noted: significant erythropenia (1,178 ± 0.145 * 1012 cells / l), a decrease in hemoglobin (31 ± 4.899 g / l) and hematocrit (0.285 ± 0.3886 l / l), thrombocytopenia (25 ± 8.216 * 109 cells / l) and leukocytosis (31.72 ± 10.15

* 109 cells / l). Parasitemia in acute course was 20%, with subacute - 35%. In acute disease, the disease lasted depending on the severity of the patient's condition for 8 to 15 days. With subacute -14-25 days.

In chronic course: general oppression, anemia with mild jaundice of visible mucous membranes, erythropenia (5.018 ± 0.5087 * 1012 cells / l), thrombocytopenia (144,8 ± 55,8 * 109 cells / l) and leukocytosis (15,58 ± 7.197 * 109 cells / l). Parasity is 15%. Duration of the disease is 24-30 days or more.

## CONCLUSION

Thus, with gemobartonellosis in cats, changes in clinical and hematological parameters are revealed.

In acute and subacute flow there was a direct correlation between the number of erythrocytes, hemoglobin and platelets. With a decrease in the number of erythrocytes, hemoglobin, and hematocrit, the number of platelets decreased. The reverse changes were observed in terms of white blood: the number of leukocytes increased due to an increase in the number of lymphocytes, monocytes and granulocytes.

In the asymptomatic course of the disease in the sick animals, clinical signs, as a rule, were not observed. Except for single cases with minor anemia of visible mucous membranes. The majority of hematological parameters were within the normal range, however, the number of monocytes was lowered.

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